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Agricultural Credit Policies in Developing Countries

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Introduction

Developing countries use a wide range of policies in an effort to reach their growth and modernization objectives, but none are more widespread and pervasive across so many countries as are agricultural credit policies and programs. In the next few minutes, I'd like to briefly review some of the key features of these policies, explain the standard economic rationale for associating expanded credit use with increased agricultural output, and then discuss some key issues commonly ignored when credit policies and programs are developed.

Common Credit Policies

It is difficult to discuss agricultural credit policies in their entirety in a few minutes. A wide variety of alternatives are being tried in developing countries and I know no good way to categorize them. But in order to give you an idea of the variety, I developed the following four categories which are in no way comprehensive or exhaustive. In the countries represented in this seminar, there may be several other policies which would suggest additional categories.

1. Quantity of credit. Many countries actively try to increase the quantity of credit channeled to agriculture relative to output or relative to the quantity of credit going to other sectors.

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*I am indebted to Dale Adams for several ideas used liberally throughout this paper. Paulo F. C. de Araujo has helped me over several years to understand agricultural credit in Brazil.

Incentives are given to lenders through rediscount mechanisms, reserve requirements, etc. Quotas may be used in an effort to force lenders to shift more of their portfolio to agriculture. The objective may be to increase the aggregate supply of credit, or through special lines of credit finance selected inputs like fertilizer, or selected crops or particular sizes and types of farms.

2. Credit terms. Probably the most common single policy in developed and developing countries alike is some type of usury law designed to protect borrowers from high interest rates. Maximum nominal interest rates may be established for certain types of loans or loans for a particular sector. Other policies affecting terms or conditions of loans are those which establish maximum repayment period as well as special lines of credit with a grace period on paying principal installments during the initial years of the loan.

3. Use of credit. Some policies focus on influencing how a borrower uses credit. Fertilizer may be provided in kind rather than cash to insure that the farmer doesn't spend the borrowed money on something else. Lenders may require that the borrower of operating credit use a full production package including improved seed, fertilizer, chemicals, etc. Supervised credit is popular in countries which link credit to technical assistance.

4. Delivery systems. Many countries spend a lot of time trying to perfect delivery systems for credit so that farmers receive desired quantitities. Some countries rely on existing institutions to channel credit to agriculture and use normal banking regulation procedures in an effort to achieve that goal. Others set up special agricultural banks and cooperatives as parallel structures to existing lending institutions.

These are only four categories of credit policies. The list undoubtedly could be expanded. A particular program may fall within several categories. For example, a small farmer lending institution may be created to increase credit supplies and reduce costs to small borrowers. The interest rate may be controlled and subsidized in order to reduce the cost of credit to the borrower.

In spite of the wide variety of credit policies found in many countries, there are some common features found in many of them:

1. Policies are designed for their expected effect on borrowers, while ignoring the effect of the same policies on lenders.
2. Interest rates are normally considered in nominal rather than real terms.
3. There is an assumption that it is possible to "tie" credit to certain inputs and products.
4. There is surprisingly little consideration of the effect of credit policies on savings behavior.

In the time I have left I would like to focus on two issues. First is the expected relation between credit policies and farmer behavior. Second, I want to briefly discuss the effect of credit controls on the lender, and specifically the effect of usury laws on <u>supply</u> as well as demand for credit.

Credit Policies and Farmer Bahavior

This section is divided into two parts. The first includes the standard production economic analysis which demonstrates how the quantity of inputs used in production may be constrained due to inadequate financing for the farmer. This analysis is the type frequently used in many countries which stress agricultural credit policies in their development strategy.

The second section uses an analysis of sources and uses of liquidity for the farm household to show how difficult it is to know precisely how borrowed capital will be used by the farm family.

Economics of Input Use

The expected effect of credit on agricultural production can be analyzed by using a production function relating the cost of using additional units of an input to the value of the expected additional output. Since many countries try to accelerate fertilizer use through credit policies, I will use fertilizer as the input in the following example. The analysis would be the same if I would have chosen seed, machinery, labor or any other input in production.

Figure 1 presents the standard assumed relationship between quantity of fertilizer used and the value of the additional crop output produced, holding all other factors of production constant. It may be easiest to think of the figure in terms of a hectare of corn. All other inputs to produce corn are held constant except fertilizer (ignoring the labor and other costs associated with applying fertilizer and harvesting additional production). The curve labeled marginal value product of fertilizer represents the additional (or marginal) amount of corn produced by each additional (or marginal) unit of fertilizer applied to the hectare of corn multiplied by the price of corn. The curve is downward sloping to indicate that successive increases in fertilizer result in successively smaller increases in corn yields, a condition which is generally assumed to exist after some level of fertilization is reached. At some point, (represented by Q_4) additional fertilizer use results in a decrease in total yield.

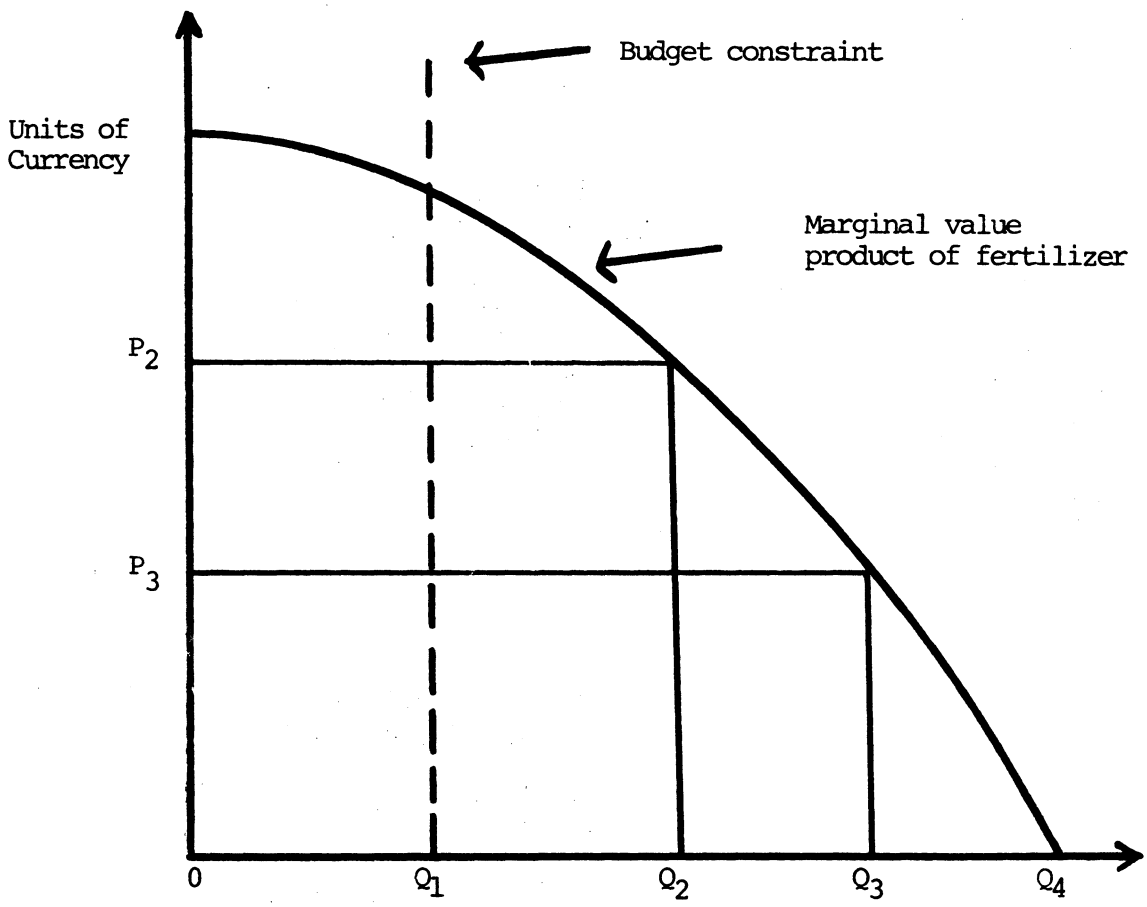


Figure 1. Marginal Value Product of Fertilizer

If a farmer is economically rationale and knows with certainty the productivity of fertilizer and corn prices, there is an optimum level of fertilizer use. That level is obtained when the marginal value product of fertilizer (MVP) is just equal to the cost of the fertilizer used, or the price of fertilizer if we assume the farmer's fertilizer price (P) is constant irrespective of quantity used. For example, if the fertilizer price is equal to P_2, then the optimum useage is Q_2 where MVP = P_2. At any point to the left of Q_2, MVP $>$ P_2 meaning that the returns from using an additional unit of fertilizer are greater than its price. Thus, a farmer would be encouraged to use more fertilizer. However, at any point to the right of Q_2, MVP $<$ P_2 so the farmer would be inclined to use less fertilizer. Likewise, if fertilizer prices drop to P_3 the optimum level of fertilizer use increases to Q_3.

One more condition must be met, however, if a farmer is to actually use the optimum levels of fertilizer identified above. He must have the financial resources required to buy the fertilizer. These resources are available from three sources: 1) his own liquidity, 2) trade credit from a fertilizer dealer that permits the farmer to buy on time, and 3) loans from institutional or noninstitutional sources of credit which provide cash to purchase fertilizer. In the absence of trade credit or loans, a farmer may have only enough liquidity to purchase Q_1 units of fertilizer, only half the optimal level when fertilizer prices are P_2. Thus, the farmer's budget constraint may prevent him from using as much fertilizer as desired. By increasing credit, a <u>quantity</u> effect may be achieved. That is, the farmer may be able to purchase optimal fertilizer quantities when his total liquidity is increased with credit. Notice that this effect could occur with both trade credit or loans.

An additional price effect can often be achieved through institutional credit. Several countries control interest rates on institutional credit at negative real rates. The net effect is that the real price of fertilizer falls for the farmer that purchases fertilizer with credit. It is similar to a price decline from, say, P_2 to P_3 with the resulting increase in optimal fertilizer use from Q_2 to Q_3.

Suppose, for example, that a farmer borrows $1000 for fertilizer at a 7 percent nominal annual interest rate for 6 months. At the end of the loan period, he repays $1035. Suppose, furthermore, that the rate of inflation is 10 percent in the same period. At the time the loan is repaid each cruzeiro is worth 90 percent of its previous value, so the real value of the $1035 is approximately $930. This decline in purchasing power of the currency in effect represents a $70 discount on the fertilizer price. Therefore, a farmer who borrows to buy fertilizer receives a discount not realized by the cash customer.

It might be concluded at this point that increased fertilizer use is directly related to the quantity and terms of agricultural credit made available to farmers. This is an assumption frequently made by policy makers when setting up credit programs. A serious mistake is made, however, by assuming such a direct relationship between credit and fertilizer. In fact, under certain conditions, a farmer may borrow funds earmarked for fertilizer but may increase his fertilizer use very little. That possibility is discussed in the next section.

Credit as a Source of Household Liquidity

The standard economic analysis used above ignores the fact that the typical rural household has several sources of, and uses for, liquidity.

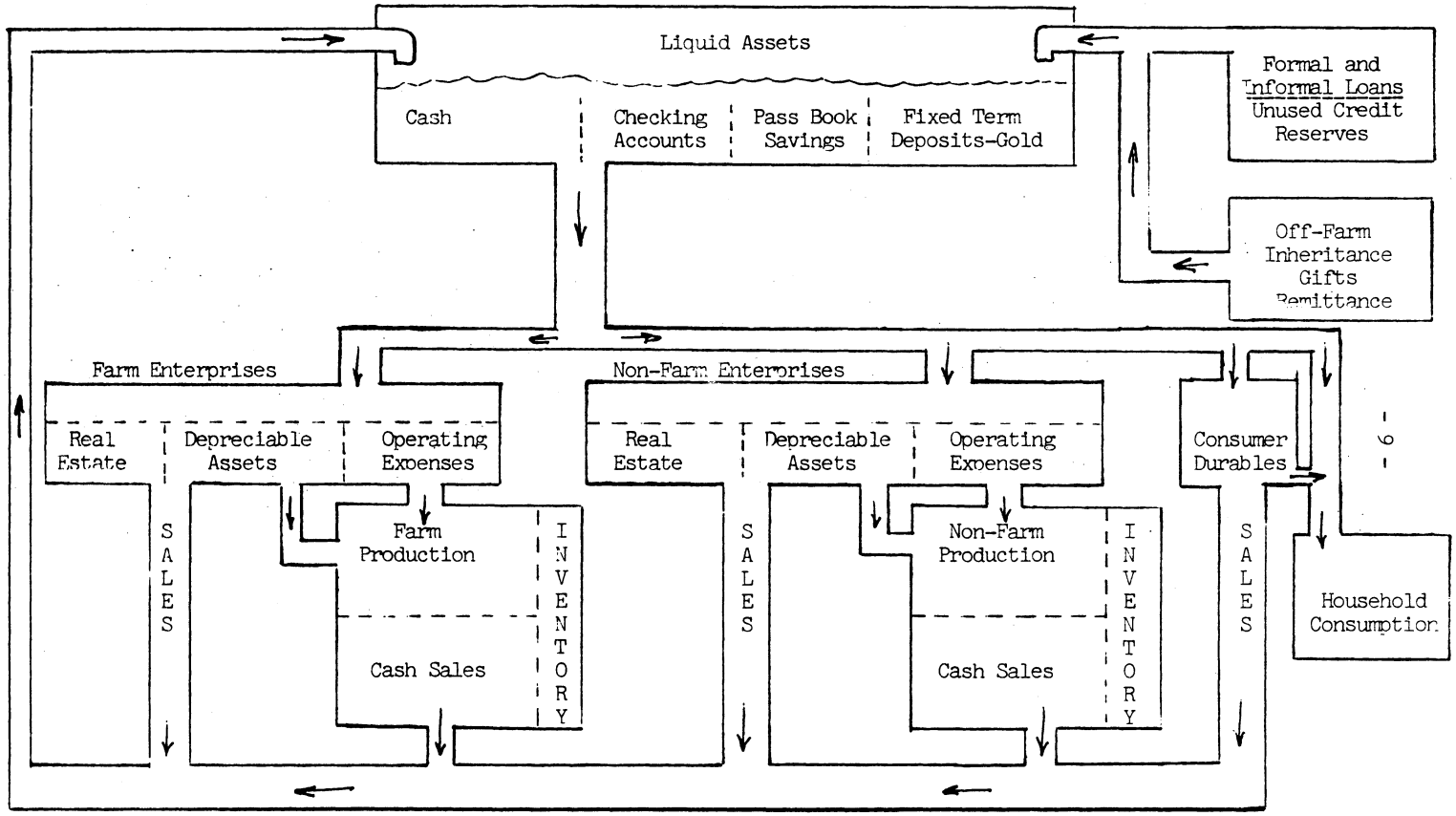
Adams and other researchers have used a hydraulic anology such as in Figure 2 to describe this point. Notice first that a household has various forms of liquid assets. These assets are complemented by off farm liquidity sources such as earnings, gifts, etc., and borrowings, both formal and informal loans. These borrowings include trade credit as well as loans. All these sources of liquidity enter and are controlled by the household. Once a unit of currency enters the income stream, it becomes indistinguishable from a unit from another source, and can be used like any other unit for household expenditures and investments. That is, units of currency are fungible.

The other important feature of household behavior demonstrated in Figure 2 is that a typical household engages in several activities which use liquidity. These activities include household consumption, financing operating costs (including fertilizer) for farm enterprises, financing operating costs of non-farm enterprises, and long term farm and non-farm investments. Each one of these activities produces a certain satisfaction or utility to the household. The relative utility of each may be quite different at any one point in time. The household reaches equilibrium in its use of funds when the marginal utility of the last unit of currency expended on one activity is equal to the marginal utility of an additional unit expended on any other activities.

Suppose that a farmer expects a high utility from using fertilizer due to the expected returns. He may be able to reallocate existing liquidity in order to purchase fertilizer. If his total liquidity is large enough or the household is flexible enough in allocating liquidity, he may be able to finance optimum levels of fertilizer use. If not, by using trade credit or loans, he may be able to acquire enough additional liquidity to purchase the fertilizer.

Suppose, however, that the farmer already plans on purchasing an "optimum" amount of fertilizer using existing liquidity. This "optimum" may be the

FIGURE 2: Sources and Uses of Farm-Household Liquidity



Adapted from: John A. Hopkins and others, Financial Management in Agriculture (Danville, Illinois: Interstate Printers and Publishers, 1973) p. 138.
Reprinted from: Adams, D., "Policy Issues in Rural Fiance and Development".

economic optimum described above, or some other level the farmer has decided upon based on some decision criteria. It might be no fertilizer at all if he is skeptical about its impact on yields or uncertain about weather, prices, etc. Providing the farmer additional liquidity may substitute for farmer's own funds in the purchase of the "optimum" amount of fertilizer. The liquidity released is then available for other alternatives. Secondly, if the terms of the credit are favorable enough relative to the utility of expenditures for other alternatives, credit for fertilizer may be diverted to other uses. The higher the expected utility from these expenditures, the greater will be the farmer's temptation to divert the credit. Policing credit use will be difficult. Even providing fertilizer in kind, as is frequently attempted, may not effectively resolve the problem if the farmer is able to resell it.

The Brazilian case is an interesting example of the point I am trying to make regarding the relationship between credit and fertilizer use. Since the mid-1960's the Brazilians have employed several policies to increase the supply of credit to agriculture. Nominal interest rates have been controlled at levels lower than the rate of inflation so borrowers have received subsidies through credit.

These credit policies have resulted in a rapid expansion in institutional credit for agriculture. As can be seen in Table 1, operating loans made in 1975 totaled almost CR $40 billion (approximately U.S. $4 billion), while total loans approached CR $90 billion. The ratio of operating loans to agricultural output rose from .07 in 1960 to .37 in 1975, while the ratio of total loans to output rose from .13 to .83. The exceptionally rapid increase in 1975 was due in part to special lines of credit for coffee recuperation and drought relief.

Table 1. Agricultural Credit and Output, Brazil, 1960-1975

Year	Loans Made During Year[a/]				Net Internal Product From Agriculture in 1975 Cruzeiros[d/e/] (5)	Ratio of Operating Loans to Product (2/5) (6)	Ratio of Total Loans To Product (4/5) (7)
	Operating Loans[b/]		Total Ag Loans				
	Number[c/] (1)	Value in 1975 Cruzeiros[d/] (2)	Number[c/] (3)	Value in 1975 Cruzeiros[d/] (4)			
1960	112	3,180	231	6,176	46,493	.07	.13
1961	184	3,280	285	6,157	48,252	.07	.13
1962	337	4,910	441	8,382	57,023	.09	.15
1963	416	4,410	549	7,267	50,182	.09	.14
1964	527	6,560	771	9,864	50,521	.13	.19
1965	509	5,730	666	8,483	56,875	.10	.15
1966	529	6,700	856	11,539	50,281	.13	.23
1967	633	9,040	1,029	14,925	53,415	.17	.28
1968	733	11,470	1,500	21,019	53,485	.21	.39
1969	675	9,624	1,145	20,713	56,737	.17	.36
1970	649	10,992	1,191	24,648	64,439	.17	.38
1971	686	12,394	1,253	28,481	76,126	.16	.37
1972	687	14,706	1,266	35,321	82,608	.18	.43
1973	771	21,288	1,400	49,852	95,996	.22	.52
1974	789	27,757	1,450	61,648	104,155[f/]	.27	.59
1975	1,076	39,446	1,856	89,997	107,801[f/]	.37	.83

a/ Source: Various Central Bank and Bank of Brazil reports. Figures represent number and value of new loans made.

b/ From 1960 to 1968, the estimates for operating loans are based on loans made by the Bank of Brazil, which was responsible for the majority of agricultural credit lent during the period.

c/ Thousands of loans.

d/ One million cruzeiros. Values adjusted by the Index "2" of Conjuntura Economica.

e/ Source: Various issues of Conjuntura Economica.

f/ Projected from the 1973 figure by compounding a 8.5 growth rate for 1974 and 3.4 for 1975.

Reprinted from Araujo, P. and Meyer R., "Agricultural Credit Policy in Brazil: Objectives and Results."

One of the Brazilian objectives has been to modernize agriculture through the use of modern inputs. Efforts have been made to increase fertilizer use through special lines of credit. The nominal interest rate on this credit has ranged from zero to 7 percent most years and large amounts of money have been lent under this program. As shown in Table 2, fertilizer use grew from less than 400,000 metric tons in 1966 to an estimated 2,400,000 metric tons in 1976.

There is no clear way of knowing the extent to which this rapid rise in fertilizer use was attributed to agricultural credit. In the same time period, fertilizer companies rapidly expanded the marketing system to make fertilizer supplies more accessible to farmers. Fertilizer salesmen aggressively competed for clients and played an extremely important role in disseminating information about fertilizer use, costs, and returns. But, an important element in their sales strategy was their ability to assist the farmer in obtaining credit for the purchase. Thus, it is unlikely that fertilizer use would have grown as rapidly as it did without the ready availability of cheap credit. However we cannot attribute all this increase to credit because that would imply that fertilizer use would have been zero without credit. Clearly that is not the case.

There is some evidence that substitution and probably diversion have occured with credit in Brazil. For example, the total quantity of fertilizer supposedly financed with credit has occasionally surpassed the amount of fertilizer actually sold. There have been reports of fraud where fertilizer dealers have inflated the amount of fertilizer sold to a farmer so he is eligible for larger amounts of the low cost credit.

These problems should be expected when credit is lent at such favorable terms as in Brazil. They should be expected, however, whenever the cost of

Table 2. Use of Chemical Fertilizers in Brazil, 1966-1976 a/

Year	North & Northeast (A)	Center-South (B)	Brazil (A+B)
	(metric tons)		
1966	28,129	352,992	381,121
1967	40,559	407,367	446,926
1968	38,426	563,284	601,711
1969	52,462	577,925	630,387
1970	89,052	909,515	998,567
1971	95,041	1,069,994	1,165,085
1972	125,508	1,321,034	1,446,542
1973	158,702	1,730,612	1,889,314
1974	165,222 /	1,611,360	1,776,582
1975	128,357 /	1,559,808	1,875,739
1976 b/	240,000 /	2,160,000	2,400,000

a/ Expressed in Nutrients. Use of Fertilizer = Domestic Production + Imports.

b/ Preliminary data.

Sources: Araujo, et al. (1974) and Prognostico Centro-Sul, 1976-1977, IEA (1976).

credit is low relative to the utility of additional household liquidity. Substitution and diversion can occur even when real interest rates are relatively high. A household is rationale to allocate liquidity to those alternatives which promise most utility. The use of fertilizer must promise high utility if the household is to use scarce liquidity on fertilizer purchase versus several other alternatives. When policy makers ignore this point, they deceive themselves by reporting that a certain amount of credit was responsible for the consumption of a specific amount of fertilizer. It is impossible to estimate precisely what consumption would have been without the credit, but it is unrealistic to think it would have been zero if fertilizer use is really profitable.

Credit Policies and Lender Bahavior

The next issue I'd like to comment on briefly is the effect of credit policies on lender bahavior. I will discuss only interest rate policies but several other policies aimed at borrowers have an often ignored perverse effect on lenders as well.

As indicated in the introduction, usury laws exist in many countries. The objective is to prevent exploitation of borrowers. The effect of usury laws is to reduce interest rates below those that would prevail under free market conditions.

Figure 3 shows a supply and demand curve for agricultural credit assuming perfect competition. This condition may not exist in many instances but the implications of the analysis may still apply under most conditions. The demand curve is drawn downward sloping based on the normal assumption that farmers will demand more credit as the nominal interest rate falls. This assumption is at the heart of the policies which try to force a reduction in interest rates in order to increase agricultural production. What is

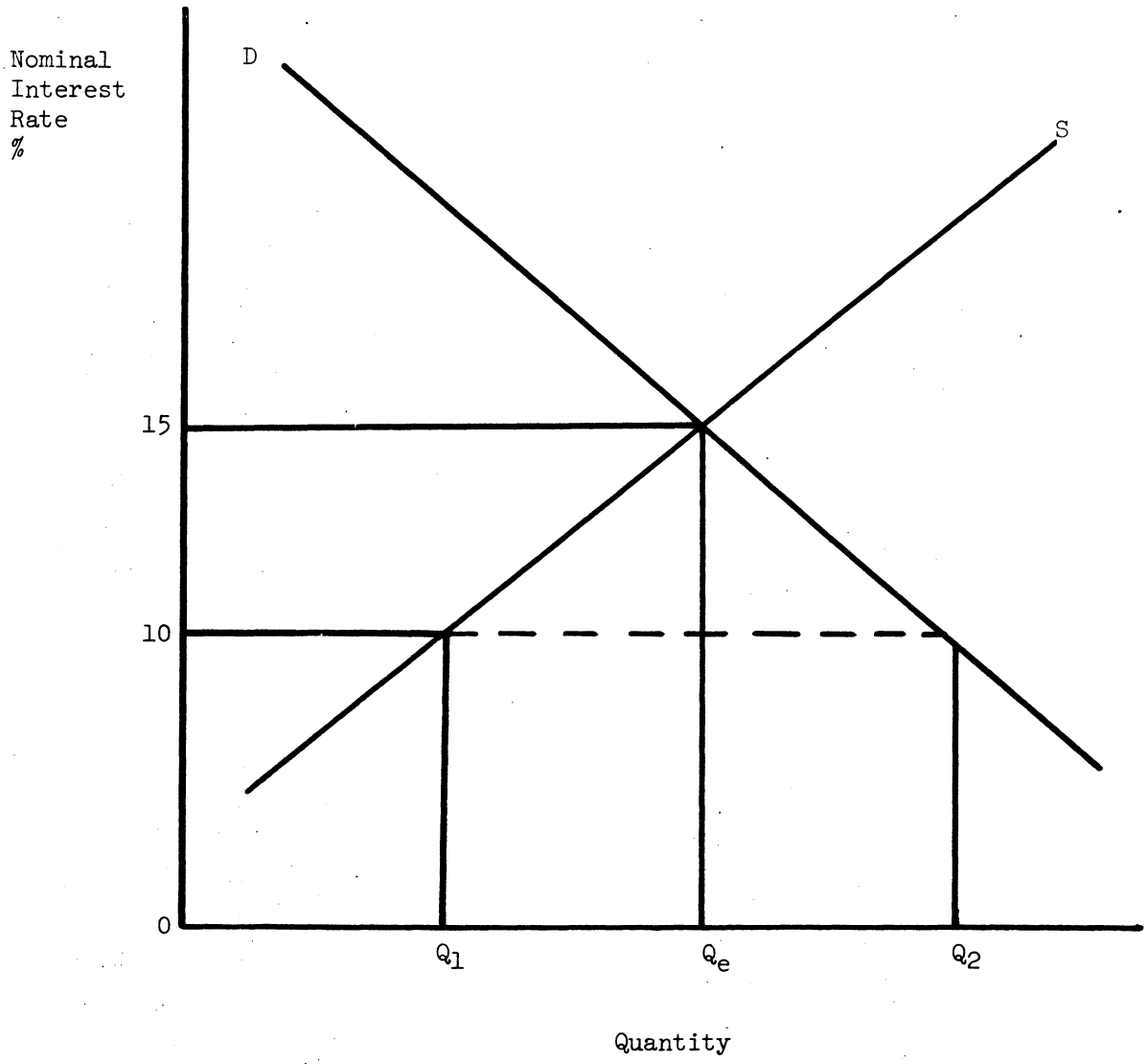


Figure 3. Supply and Demand for Agricultural Credit

frequently ignored is that there is also a supply curve for agricultural credit. That curve is assumed to be upward sloping to reflect the fact that if lenders are going to increase credit supplies, the interest rate must rise. Interest pays the cost of increased lending, stimulates savers to save more, and helps cover the possible risks a lender may have when lending is increased.

The exact slope or elasticity of the demand and supply curves is extremely important in any particular case in determining the impact of interest rate controls on lenders and borrowers. Assume for our purpose that Figure 3 represents the case of a country where the equilibrium interest rate for agricultural credit would be 15 percent. Assume, furthermore, that a 10 percent usury law is imposed. With a reduced interest rate, borrowers would prefer to increase borrowings from Q_e to Q_2. Lenders, however, would prefer to reduce the quantity lent from Q_e to Q_1. We then have a situation of excess demand: borrowers would be willing to borrow more at the 10 percent interest rate than lenders are prepared to lend.

Two outcomes frequently occur when this situation arises. First, lenders realize that borrowers are willing to pay more so they increase non-interest costs such as application fees, closing costs, etc. Commercial banks request that borrowers retain a certain amount of funds in non-interest earning accounts (compensating balances). Secondly, lenders ration credit to farmers so as to reduce lending costs and risks. Large loans are frequently made to large borrowers with substantial collateral and who are personal friends of the lenders. Small farmers with little collateral and little social and political status are excluded.

Recognizing this response by lenders, policy makers frequently introduce quotas designed to force lenders to increase the amount lent at the

controlled interest rate. These efforts may fail if lenders are able to redefine the loans considered agricultural or to distort their statistics in other ways.

There is yet another possible consequence of the usury laws. If they are effectively enforced, lenders will have to reduce the interest rate they can afford to pay on savings deposits. The central bank frequently provides much of the funds lent by the lenders. The lenders come to rely on this easy source of capital and may largely ignore trying to attract individual savings. Even if they tried, they may not mobilize many savings because of the low interest rate they could afford to pay the savers. Thus a situation may develop where few incentives exist for individual savings, consumption or holding of unproductive assets is encouraged, and lenders develop a dependency on central bank capital. The public sector is then forced to mobilize savings through unpopular means of taxation and inflation, or through international borrowing.

The point I'm trying to make in this section is that policies designed to help borrowers may have a perverse and pervasive effect. Usury laws may help the lucky few that receive credit by reducing their interest costs. Other borrowers may be denied credit, however. Savings may be discouraged. Public authorities waste time and talent trying to police unviable regulations, while lenders waste time and talent trying to avoid them. The social costs may be very high. Whatever benefits that exist may be largely captured by a few large wealthy farmers thereby exacerbating the income distribution problem.

Conclusions and Recommendations

Obviously I've talked more of problems today than solutions. The specific problems of your agricultural credit system may well be related

to these problems however. What implications are derived from this analysis?

First, recognize that households have competing uses for liquidity. If you want to insure that credit is used for the purpose you intend, be certain that the expected utility of additional expenditures for that purpose are high. Too often many of the inputs, crops or packages you try to encourage do not provide as much expected utility as you assume. Your efforts to force borrowers to behave in a manner contrary to their preferences are doomed to failure. Be modest about the expected benefits of agricultural policies until you know more about how farm households will respond to them. The standard production economic theory we typically use to predict behavior provides only part of the answer.

Second, recognize that credit policies designed to affect borrower behavior may have equally important perverse impacts on lenders and savers. The benefits to borrowers must be weighed against these costs. Efforts to force lenders to behave contrary to their preferences are likely to meet as many problems as those encountered with borrowers. Lenders are probably even more sophisticated than borrowers in beating your rules and regulations.

In general if agricultural production is really profitable, farmers can be expected to respond. Household liquidity will be allocated in order to finance production. On the other hand, if production is not profitable, cheap credit supplies are likely to have little impact. Much of the emphasis on cheap credit in development schemes is premature. We first must evaluate how the scheme is perceived by farmers in order to determine if credit is really the chief bottleneck.

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